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# **TESTING FOR THE INVARIANCE OF A CAUSAL MODEL OF FRIENDSHIPS AT WORK: AN INVESTIGATION OF JOB TYPE AND NEEDS**

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# TESTING FOR THE INVARIANCE OF A CAUSAL MODEL OF FRIENDSHIPS AT WORK: AN INVESTIGATION OF JOB TYPE AND NEEDS

## ABSTRACT

*The relationship between workplace friendships and organisational outcomes were investigated. Employees from diverse industries responded to an Internet-based survey (n=445). A previously supported model of workplace relationships (Morrison, 2004) was cross-validated, confirming linkages between friendships at work and organisational outcomes. The model was invariant across groups reporting differing needs for affiliation, autonomy or achievement, but non-invariant across groups reporting occupying relatively less or more interdependent jobs. Results suggest that the interdependence of individuals' jobs affects the salience of work friendships more than subjective needs.*

## INTRODUCTION

Numerous close friendships evolve from existing formal relationships in workplaces and, for many people, these relationships are maintained within the organisational setting. Previous research has supported the notion that increased friendship opportunities at work impact positively on organisational outcomes such as job satisfaction and organisational commitment, and reduce employees' intention to leave an organisation (Morrison, 2004, Riordan and Griffeth, 1995, Richer et al., 2002, Morrison, 2003, Nielsen et al., 2000).

The ultimate outcome variable in the current study is intention to leave, a critical precursor to turnover (Tett and Meyer, 1993). Work turnover represents one of the most important issues for any organisation; money invested in the recruitment, training and development of an individual who leaves an organisation is seldom recouped (Richer et al., 2002). This study builds on previous findings, which have shed light on the impact of workplace friendship variables on turnover, organisational commitment and job satisfaction (Morrison, 2004), by cross-validating a previously supported causal model and testing for invariance across sub-groups.

## RELATIONSHIPS IN A WORKPLACE CONTEXT

Informal interpersonal relationships other than romantic relationships are examined in the current study. There has been research which has looked at romantic relationships between work-mates, rather than friendships (e.g. Quinn, 1977, Anderson and Hunsaker, 1985) but sufficient research exists to suggest that friendship and romantic relationships are distinct relational types, which should be investigated fully in their own right (Rubin, 1970, Lamm and Wiesmann, 1997, Bridge and Baxter, 1992). Similarly, although there is a wide literature on formal organisational dyads such as supervisor-subordinate and mentor/protégé (e.g. Kram and Isabella, 1985, Sias and Jablin, 1995, Vecchio and Bullis, 2001), very little research has examined the role of informal relationships (such as friendships) as they relate to organisational effectiveness (Dillard and Fritz, 1995). Thus, this study focuses specifically on friendship relationships in the workplace.

Although there are authors who hold that friendships at work are to be avoided (e.g., Eisenberg, 1994), several empirical studies highlight the positive organisational consequences of these relationships (e.g. Richer et al., 2002, Riordan and Griffeth, 1995), which can offer significant and rewarding benefits to individuals at work. Workplace friendships can provide increased communication (Kramer, 1996), support (Buunk et al., 1993), trust, respect, co-operation, growth, development, energy and security that, in turn, influence work related attitudes and behaviours (Foote, 1985, Riordan and Griffeth, 1995, Krackhardt and Stern, 1988).

In sum, much of the literature focusing on workplace friendships suggests that significant linkages exist between workplace friendships and organisational outcomes (Morrison, 2004, Riordan and Griffeth, 1995, Richer et al., 2002, Morrison, 2003, Nielsen et al., 2000). Yet the question remains; are there individual differences in the way measured variables relate to one another? It was on the basis of four variables (interdependence of work role and needs for affiliation autonomy and achievement) that the sample in the current study was divided and tested for group invariance in a previously supported model of workplace friendships (Morrison, 2004). The impact of personal needs and job type on the linkages between workplace friendships and organisational outcomes are enquiries that have yet to receive empirical attention. Highlighting when and for whom friendships at work are most salient should lead to insights into the application of relationship research to the work environment.

## NEEDS FOR AFFILIATION, AUTONOMY AND ACHIEVEMENT

Personal characteristics, such as work ethic, locus of control and central life interest in work have been found to relate to organisational commitment (Meyer and Allen, 1991). Similarly, higher order needs are individual difference variables that, while they have seldom been studied in this context, might logically relate to the impact of workplace friendships. Needs for affiliation and autonomy are examined in the current study, and may be defined as follows:

- The *need for affiliation* is the desire to interact socially and to be accepted by others.
- The *need for autonomy* is the desire for self, rather than other, direction.
- The *need for achievement* is the desire to accomplish difficult tasks, maintain high standards and work toward distant goals.

Needs theory holds that people have different levels of needs for affiliation, power, autonomy and achievement (Heckert et al., 2000), and will be motivated to fulfil these needs. Needs have been studied with a view to assessing their importance as possible determinants of person-occupation fit and it has been shown empirically that the extent to which these needs are met predicts job satisfaction and competence in a number of occupations (Medcof and Hausdorf, 1995). Higher order needs have also been found to correlate with organisational commitment (Steers, 1977, Steers and Braunstein, 1976), and opportunities to satisfy needs have been shown to predict job satisfaction and tendency to leave (Zinovieva et al., 1993) as well as organisational commitment (Shouksmith, 1994). These correlations suggest the possibility that individuals differ in their tendency to report satisfaction or to become committed to an organisation.

It is useful to consider the interactions between personal dispositions and the environment when examining the effects on organisational outcomes. Individuals whose work experiences are compatible with their personal dispositions (i.e. provide fulfilment of needs) should have a more positive experience of work than those whose work experiences are less compatible with their needs (Meyer and Allen, 1991). That is to say, that the *same* work environment might engender differing levels of satisfaction or commitment in employees, depending on their differing needs. Research in Germany into the influence of achievement and affiliation variables on work motivation and job satisfaction suggests that needs for affiliation and achievement, and the degree to which these needs are met have a significant influence on employees' experience of work (Pifczyk and Kleinbeck, 2000).

A particular type of work experience (in this instance, having friends at work) will probably influence commitment and/or satisfaction only among employees for

whom it is relevant (for example, those reporting high needs for affiliation). Thus it is likely that people who report high needs for affiliation will be relatively more affected by a lack of friends at work while, for those reporting relatively high needs for autonomy, workplace friendships will have less salience.

## INTERDEPENDENCE OF WORK ROLE

It is possible that the salience of informal relationships will vary, depending not only on personal characteristics, but also on job type. For the purposes of this investigation the level of interdependence in an individual's job is conceptualised to be on a continuum from very interdependent to very autonomous. It is likely that, for individuals who report requiring regular communication and interaction with colleagues in order to fulfil their duties, informal relationships will generally have more salience or importance, than for those who report being able to do their work on their own (i.e. who have relatively more autonomous jobs).

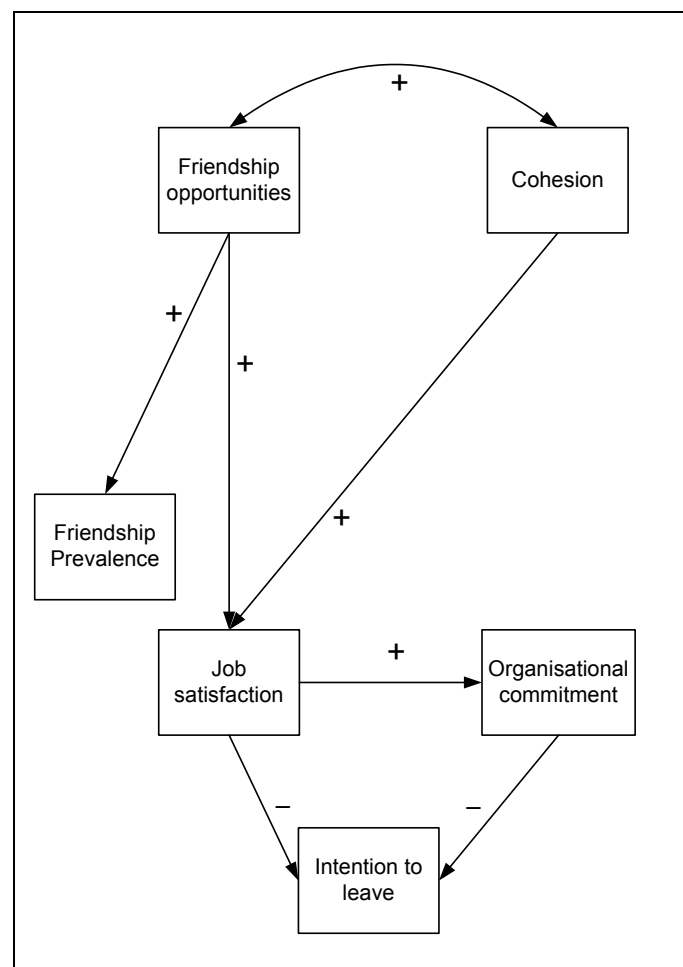
The notion that relationships in the workplace will have more salience for people in particular work roles is supported by the findings of Winstead et al. (1995) who studied both general and academic staff in a University context in Virginia (U.S.A). Winstead et al. found that the effects of relationship factors (in this case maintenance difficulty) on job satisfaction were only apparent for general staff (as opposed to faculty members). An explanation Winstead et al. give for this is that, for faculty, the intrinsic qualities of their job (teaching, research, supervising students) are more important to them than the non task-related aspects; while for general staff, whose work may be more routine or work roles more interdependent, the social, non-work aspects are more salient. Alternatively, for academic staff, social needs may be met in the course of their job; teaching, supervising and collaborative research all being very social activities. For general staff, on the other hand, rewarding social interactions may be more rare, and therefore more valued. In addition, faculty have significantly more autonomy at work, and more control over their personal space, usually having their own office. Consequently academic staff members are able to simply avoid negative interactions more easily than general staff, who may have to liaise frequently with others, or work in an open plan office. Either way therefore, it seems likely that the *type* of work an individual does will interact with the impact of



friendships at work, with relationships being generally more salient for jobs which are relatively more interdependent.

## MODEL OF ORGANISATIONAL RELATIONSHIPS

The causal model of organisational relationships tested in the current study was first proposed by Morrison (2004, 2003) and was supported by a slightly smaller data set (n=412) than that used in the current study. In order to demonstrate the model, which is to be cross-validated and tested for group invariance in the current study, several variables shown to relate to each other in organisational contexts are examined. Figure 1 illustrates the theoretical model of the relationships between friendships at work, and organisational outcomes tested in the current study.



*Figure 1: Theoretical model of the impact of workplace relationships*

### *Friendships related to cohesion*

The cohesiveness of a work group or team is a salient aspect of many employees' experience of their workplace. Odden and Sias (1997) investigated outcomes of a cohesive work environment and found, among other things, that climates perceived as high in cohesion were related to larger proportions of collegial and special peer relationships. In Morrison (2004) opportunities for friendship were positively correlated with cohesion.

### *Friendships related to job satisfaction*

One of the central aspects of the model is the relationship between the presence of friendships at work and job satisfaction. There is empirical evidence that suggests that co-worker relations are an antecedent of job satisfaction. The earliest of these studies was by Hackman and Lawler (1971) who originally developed the job characteristic termed 'friendship opportunities' and found significant positive relationships between friendship opportunities and job satisfaction. In a more recent study, Markiewicz et al. (2000) found that the quality of close friendships was associated with both the career success and job satisfaction of employees.

Another study examining the impact of friendship on satisfaction was by Riordan and Griffeth (1995) who hypothesised and tested a theoretical model of the relationship between perceived friendship opportunities in the workplace, and work-related outcomes. Riordan and Griffeth found that friendship opportunities were associated with increases in job satisfaction, job involvement and organisational commitment, and with a significant decrease in intention to turnover. Nielsen et al. (2000) also report a positive correlation between friendship opportunities, friendship prevalence and job satisfaction; furthermore they found that those experiencing friendship at work were less likely to want to leave their current jobs. These findings highlight the positive impact workplace friendships can have for employees within organisations, particularly in terms of their satisfaction with their jobs.

### *Job satisfaction related to organisational commitment.*

Organisational commitment can be defined as the relative strength of an individual's identification with, and involvement in, an organisation (Levy, 2003). Organisational commitment is distinguished from job satisfaction in that organisational commitment is an affective response to the whole organisation, while job satisfaction is an affective response to specific aspects of the job (Williams and Hazer, 1986). Job satisfaction was found to be antecedent to commitment in Morrison (2004); an employee is unlikely to form strong organisational commitment if they are not satisfied with their job, reflecting previous literature which also suggests that job satisfaction is a causal antecedent of commitment (e.g. Riordan and Griffeth, 1995, Porter et al., 1974, Williams and Hazer, 1986).

### *Intention to leave*

Much of the research in this area, while it does not dispute that commitment develops from satisfaction, indicates that both satisfaction and commitment contribute independently to the turnover process (Tett and Meyer, 1993, Stumpf and Hartman, 1984, Angle and Perry, 1981, Porter et al., 1974). Job satisfaction, organisational commitment, and intention to leave are among the most commonly proposed antecedents to turnover (Tett and Meyer, 1993) and are almost invariably reported to be significantly related (e.g. Steers, 1977, Cohen, 1993, Riordan and Griffeth, 1995, Tett and Meyer, 1993, Cohen and Hudecek, 1993, Hackett and Lapierre, 2001, Lee et al., 2000, Irving and Meyer, 1994, Kaldenberg et al., 1995, Meyer et al., 2002, Porter et al., 1974, Mobley, 1977). These relationships were supported in Morrison (2004).

Overall, the literature reveals considerable evidence that interpersonal relationship factors bear importantly on employees' experience of work. Knowledge of the causal relationships between variables, however, is limited for several reasons.

First, there is a paucity of systematic empirical research on the topic, and what does exist comes primarily from the United States. The lack of research from countries and cultures other than the United States highlights the importance of

examining the generalisability of prior research, looking at the impact of friendships at work in environments and countries other than corporate America.

Second, although some previous researchers in this area (e.g. Richer et al., 2002, Riordan and Griffeth, 1995) have used Structural Equation Modelling to ascertain probable causal relations between variables, they seldom cross-validate their findings to address problems associated with post-hoc model fitting: specifically the risk that post hoc model modification may be driven by characteristics of the particular sample on which the model was tested (Byrne, 2001) and fits some idiosyncrasy of the data set rather than reflecting true relationships between variables.

Third, and most central to the current study, the question remains of whether the proposed model is invariant across individuals from sub groups of the surveyed population; namely those who report working in relatively less or more interdependent jobs, and those who report relatively greater and lesser needs for affiliation and autonomy.

The present study addresses these limitations and proposes a model comprising empirically grounded variables, testing the directional influence of the variables within one framework. Specifically the purposes of the study are to: (a) cross-validate the previously supported model across independent samples from within the full sample, and (b) test for the invariance of the specified model across those who report working in relatively less or more interdependent jobs, and those who report relatively greater and lesser needs for affiliation and autonomy.

**Hypothesis 1:** That the previously supported model will be invariant across two groups of randomly assigned respondents, thereby validating the model.

**Hypothesis 2:** That the model will be non-invariant across groups of individuals who report having:

- (a) high versus low needs for affiliation
- (b) high versus low needs for autonomy
- (c) high versus low needs for achievement
- (d) less or more interdependent jobs.

## METHOD

### *Participants*

Four hundred and forty-five individuals responded to the questionnaire, this total comprised the 412 respondents reported in Morrison (2004) and an additional 33 respondents who subsequently responded to the survey. A demographic summary is presented in Table 1. Respondents ranged from 19 to 64 years in age, with a mean age of 35 years (s.d. = 11.07). There was variety in the industries/sectors respondents reported working in. The largest reported sector was tertiary education (92 respondents) followed by health care (including psychology, psychiatry and physiotherapy, 53 respondents). People responded to the survey both from New Zealand and internationally, respondents were primarily from Western countries but the international mix gives the findings wider generalisability than previous studies, using only American respondents (e.g. Winstead et al., 1995, Riordan and Griffeth, 1995, Richer et al., 2002, Nielsen et al., 2000). As there were no exclusion criteria (other than being unemployed) the variety in responses to a question asking what job type individuals had, was almost as varied as the number of respondents. Respondents were from almost every type of occupation, from medical doctors, to academics, to cleaning staff, to police.

<i>Variable</i>		<i>Valid percent</i>
Sex	(5 missing)	
	Males	31.2
	Females	68.8
Age	(9 missing)	
	< 20 years	2.3
	20-29 years	38.5
	30-39 years	27.8
	40-49 years	17
	50-59 years	13.3
	Over 60 years	1.1
Country of origin	(5 missing)	
	New Zealand	66.7
	U.S.A.	14.8
	United Kingdom	8
	Australia	4.8
	Canada	1.1
	Other	4.1

*Table 1: Break down of demographic data. Values are presented in percentages excluding respondents who declined to answer*

### *Materials*

Data were gathered using a self-administered, Internet-based questionnaire, which was designed to measure the interdependence of respondent's jobs, needs for affiliation and achievement, workplace friendship opportunities, workplace friendship prevalence, cohesion, job satisfaction, organisational commitment and intention to leave. Most of the instruments and survey questions relevant to the current study are fully described in Morrison (2004) and include the Workplace Friendship Scale (Nielsen et al., 2000), the Workgroup Cohesion Scale (Campion et al., 1993), the Organisational Commitment Questionnaire (Mowday et al., 1979), the Job Satisfaction Scale (Warr et al., 1979), and a measure of intention to leave (Mobley, 1977).

Also included in the survey were two interdependence questions and the Needs Assessment Questionnaire (Heckert et al., 2000), which were used to divide the sample and test for group invariance.

### *Interdependence questions*

In order to divide the sample into two groups according to the interdependence/autonomy of their jobs, two questions were written by the author and included in the questionnaire. The items, rated on a 7-point likert type scale ranging from 1 (strongly disagree) to 7 (strongly agree), are shown in Table 2.

A measure of respondents' autonomy of work role was calculated by reverse scoring question one and taking the mean of the two scores (similarly, a measure of the level on interdependence of the respondents' jobs may be calculated by reverse scoring the second question and calculating the mean). To check the psychometric properties of the items, their correlation with existing scales was assessed. The 'autonomy of work role' score was negatively correlated with the social support factor of the cohesion scale ( $p < .001$ ), the friendship prevalence scale ( $p < .05$ ) and the need for affiliation subscale ( $p < .001$ ), suggesting discriminant validity. The 'autonomy of work role' score was significantly positively correlated with the 'need for autonomy' subscale (Heckert et al., 2000) ( $p < .001$ ), suggesting convergent validity. For use in the current study, the second of the two interdependence items was reversed scored and the mean of both items was calculated to obtain an overall 'interdependence of work role' score for each respondent.

### *The Needs Assessment Questionnaire*

In order to divide the sample into groups according their needs for affiliation and autonomy the Needs Assessment Questionnaire was used. The Needs Assessment Questionnaire was developed by Heckert et al. (2000) and was designed to measure four needs; those for achievement (nAch), affiliation (nAff), autonomy (nAut), and dominance (nDom). The needs relevant to the current study are those related to affiliation and autonomy, as these are the needs most applicable to friendships. For a full description of the validity and reliability of the Needs Assessment Questionnaire see Heckert et al. (2000). The results from Heckert et al.'s study indicate that the Needs Assessment Questionnaire is both reliable and valid, with both student and worker samples, for measuring needs.

Factor analysis of the Needs Assessment Questionnaire in the current study revealed that, for both the affiliation and autonomy subscales, three of the five items

in the original scale loaded together as factors, scores for these remaining three questions were averaged to give each respondent a score for both affiliation need and autonomy need. The items used are presented in Table 2.

<i>Affiliation</i>	<i>Autonomy</i>	<i>Interdependence of work role</i>
I try my best to work alone on a work assignment. (R)	I would like to be my own boss.	In order to fulfil my duties at work, regular communication and/or interaction with my colleagues is important.
I prefer to do my own work and let others do theirs. (R)	I would like a job where I can plan my work schedule myself.	The type of work I do can be done satisfactorily on my own, without regular interaction and/or communication with my colleagues (R).
When I have a choice, I try to work in a group instead of by myself.	I would like a career where I have very little supervision.	

*Table 2: Items used to measure affiliation, autonomy and interdependence of work role*

### *Procedure*

Initially, friends and acquaintances of the author were sent an email inviting them to complete an online questionnaire, which included a link to the data collection site ([www.studentresearcher.com](http://www.studentresearcher.com)). In addition two email lists, EMONET (a list of academics and practitioners in the field of emotions in organisations) and IOnet (a list of Industrial Organisational psychologists in New Zealand) were sent the email; all were encouraged to pass it on to friends and colleagues. Once 445 people had submitted their responses to a database through the Internet data-collection site, the data were downloaded and used to create the measurement models of the scales and test the theoretical model.

## RESULTS

### *Analysis*

Analyses were based on the AMOS (Arbuckle, 1999) program, and were conducted in six stages. First, measurement models of the scales used to measure the latent variables, derived from Morrison (2004), were confirmed with the larger data set. Second, the data were assessed for goodness of fit to the proposed model. Third, the data were randomly split into two, to form calibration (n= 230) and validation



( $n=215$ ) samples. Fourth, the calibration sample was assessed for goodness of fit to the proposed model. Fifth, the model was cross-validated by testing for the invariance of all causal paths across the second independent sample. This procedure is outlined by Byrne (2001) and involves first performing an omnibus test, determining the goodness of fit for the two groups in combination, and with no equality constraints imposed. Having constrained the structural paths to be equal across groups it is possible to compare the constrained model with the initial multi group model, in which no equality constraints were imposed, to determine if the causal structure is invariant. The change in chi-square value ( $\Delta\chi^2$ ) provides the basis for comparison with the initial multi group model. Finally, respondents were divided into groups using median splits, and the validated model was then used to test for invariance between individuals who reported having relatively less ( $n = 201$ ) and more ( $n = 244$ ) interdependent work roles, those who indicated high ( $n = 238$ ) versus low ( $n = 207$ ) needs for affiliation, those who reported high ( $n = 268$ ) versus low ( $n = 177$ ) needs for autonomy and those who reported high ( $n = 236$ ) versus low ( $n = 209$ ) needs for achievement.

Assessment of model fit was based on multiple criteria, reflecting statistical and practical considerations (Byrne, 2001); these were (a) the chi-square ( $\chi^2$ ) likelihood ratio statistic, (b) the Comparative Fit Index (CFI: Bentler, 1990), the Parsimonious Normed Fit Index (PCFI: Mulaik et al., 1989), and (c) the Root Mean Square Error of Approximation (RMSEA: Browne and Cudeck, 1993). The CFI is a revised version of the Bentler-Bonnet (Bentler and Bonett, 1980) normed fit index that adjusts for degrees of freedom. The CFI ranges from zero to 1.00 and measures covariation in the data; a value  $>.90$  indicates a good fit to the data (Byrne, 1994, Byrne, 2001). The PCFI is calibrated from the CFI; it takes parsimony of the model into consideration when calculating goodness of fit. Mulaik et al. (1989) caution that PCFI values are often lower than what is generally considered acceptable on the basis of normed indices of fit; goodness of fit indices in the .90s accompanied by PCFI indices in the 50s are not unexpected. The RMSEA is one of the most informative indices in SEM analysis and is sensitive to the complexity of the model; values less than .05 indicate excellent fit, and values less than .08 represent an adequate fit.

### *Measurement Models of the Scales*

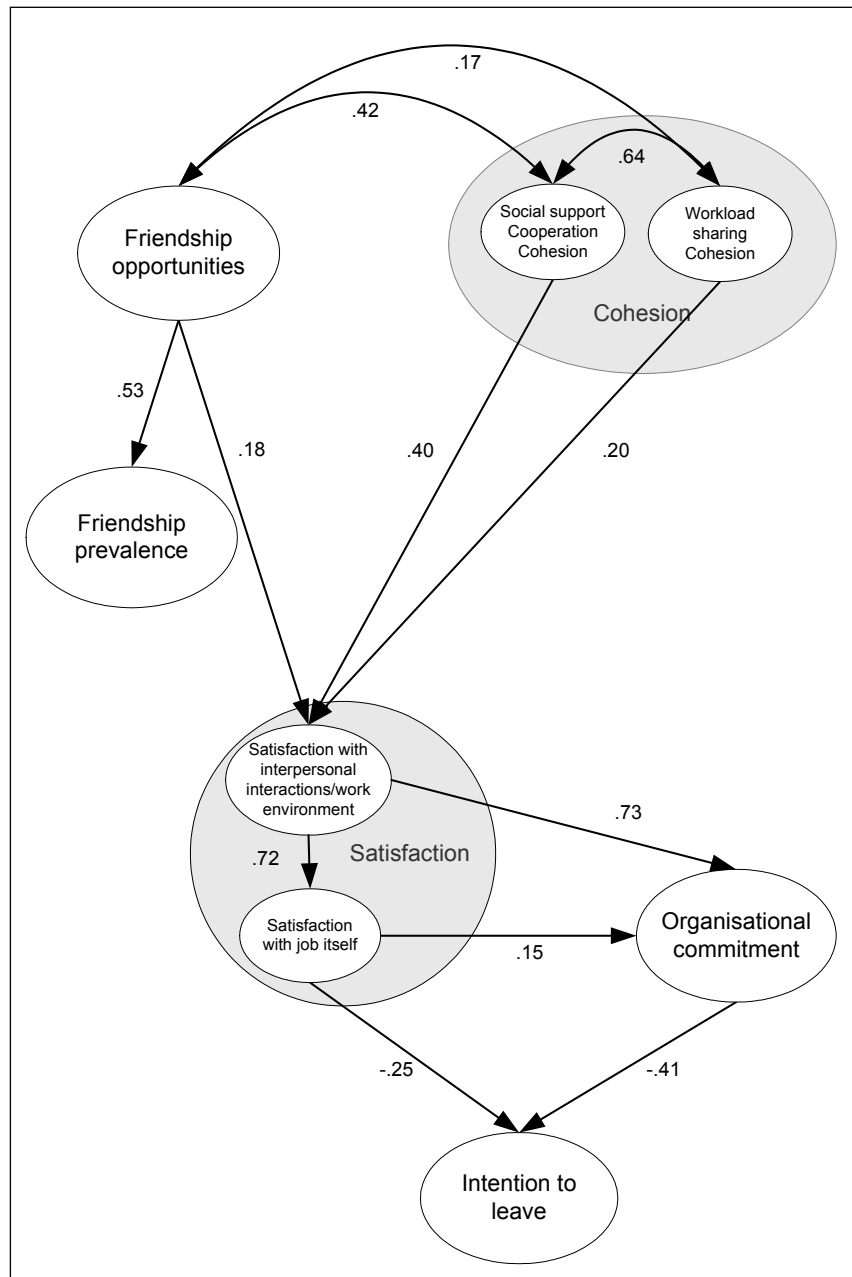
The computer program AMOS (Arbuckle, 1999) was used to create measurement models of the scales. If the fit indices did not indicate a good fit to the model, the modification indices<sup>i</sup> and expected change statistics related to the covariances for each model were inspected for evidence of misspecification associated with the pairings of items. If there was evidence that the model was misspecified, the 'problem' items (i.e. those which had overlapping content with other items) were removed in a post hoc analysis, and the models were respecified without the items, resulting in a much better fit of the model to the data. The measurement models of the scales used in the current study remained relatively unchanged from Morrison (2004)<sup>ii</sup>. The fit indices for each measurement model show good fit of the data to the models, fit indices are presented in Table 3. The reliability alphas for each subscale were acceptable, ranging from .70 to .91. Both the cohesion scale and the satisfaction scale were found to have two distinct factors<sup>iii</sup>.

Scale	Number of factors	$\chi^2$	df	PCFI	CFI	RMSEA
<b>Workplace friendship scale</b>	2	40.59	13	.60	.98	.069
Job satisfaction scale	2	106.12	34	.72	.96	.069
Cohesion Scale	2	61.10	19	.66	.97	.071
Organisational Commitment Questionnaire	1	153.70	54	.79	.96	.064

*Table 3: Fit Indices for the measurement models (n=445)*

### *Model of Workplace Relationships*

The result of the SEM analysis is shown in Figure 2; there are eight latent variables, three hypothesised correlations and nine hypothesised regression paths, indicated by arrows. All correlations and regression paths shown are significant ( $p < .05$ ). In spite of the slightly larger data set, regression weights between variables were relatively unchanged from Morrison (2004). The data supported the notion that friendship opportunities (leading to increased friendship prevalence) would be positively correlated with the cohesiveness of a workgroup, that friendship opportunities and cohesion would be antecedent to job satisfaction, that friendship opportunities and cohesion would impact positively on organisational commitment (mediated by satisfaction), and that satisfaction and commitment would both be antecedent to intention to leave.



*Figure 2: Results of SEM analysis of the theoretical model. Values represent standardised estimates and correlations based on the full sample (n=445). All paths shown are significant ( $p < .05$ )*

## Comparing Groups

*Calibration compared to validation sample:* For the purpose of cross-validation, the hypothesised model was tested for its replication across two independent (random) samples, i.e., the calibration and validation groups (Byrne, 2001). The calibration sample showed adequate fit to the model (CFI = .89, RMSEA = .05). From an omnibus test, which determines the goodness of fit for the two groups in combination, and with no equality constraints imposed, the fit is adequate (CFI = .88, RMSEA = .04,  $\chi^2_{(1234)} = 2214.8$ ). Next, to test for invariance across groups, equality constraints were specified by labelling all parameters in the model equal across the two groups. From Table 4 the change in chi-square with 44 degrees of freedom is 48.5 ( $\Delta\chi^2_{(44)} = 48.5$ ). Since this test statistic is not statistically significant, the model is shown to be invariant across the two groups.

<i>Causal friendship model</i>	<i>Omnibus test / baseline model (no equality constraints imposed)</i>	<i>Comparative model (Factor loadings, variances and covariances constrained equal)</i>	$\Delta\chi^2$	$\Delta df$	<i>Statistical significance</i>
	$\chi^2$ df	$\chi^2$ df			
Random sample (calibration versus validation sample)	2214.8      1234	2263.3      1278	48.5	44	ns
High versus low Affiliation needs	2238.3      1234	2282.8      1278	44.5	44	ns
High versus low Autonomy needs	2279.5      1234	2328.2      1278	48.7	44	ns
High versus low Achievement needs	2359.0      1234	2413.1      1278	54.1	44	ns
High versus low interdependence of job	2291.7      1234	2387.2      1278	95.5	44	$p < .001$

*Table 4: Chi-square statistics for tests of invariance across sub groups of the sample*

## *Needs for affiliation, autonomy and achievement*

The invariance-testing strategy described above was then used to test for the invariance of the causal structure for respondents reporting relatively high versus low needs for affiliation autonomy and achievement. Table 4 shows that the differences in chi-square values ( $\Delta\chi^2$ ) between the second tests and the omnibus tests were not statistically significant ( $\Delta\chi^2_{(44)} = 44.5$ ,  $\Delta\chi^2_{(44)} = 48.7$  and  $\Delta\chi^2_{(44)} = 54.1$  for the affiliation, autonomy and achievement group comparisons respectively). Thus, the high autonomy-need group does not differ significantly from the low autonomy-need group

in terms of the relationships between variables in the model. Similarly the high affiliation-need and high achievement-need groups do not differ significantly from the low affiliation-need and low achievement-need groups (i.e., the groups are invariant). Thus, reported needs seem not to influence the way the measured variables in the tested model relate to each other.

#### *Interdependence of work role*

The same invariance testing strategy was then used to test for the invariance of structural paths across groups of respondents who reported having comparatively less or more interdependent jobs. From the omnibus test, the goodness of fit of the model for the two groups in combination, and with no equality constraints imposed, is adequate (CFI = .88, RMSEA = .044,  $\chi^2_{(1234)} = 22291.7$ ).

Next, having constrained all parameters to be equal across groups it is possible to compare the results with the initial multi group model to determine if the hypothesised causal structure is invariant across the two groups. From Table 4, the change in chi-square with 44 degrees of freedom is 95.5 ( $\Delta\chi^2_{(44)} = 95.5$ ), which is statistically significant ( $p < .001$ ); this indicates that the fit of the data to the model is noninvariant (i.e., different) across the two groups (i.e., those reporting having (a) relatively less and (b) relatively more interdependent jobs).

Given this finding of noninvariance, the next task is to locate the nonequivalent parameters in the model. This process involves a series of logically ordered tests for invariance, first testing for the equivalence of the factor structure and then for the equivalence of the structural model. By doing this, it is possible to determine which parameters in the model are different between those in relatively less and more interdependent jobs. Table 5 shows the results bearing on this series of tests for invariance. Each model tested is compared to the baseline model. A significant change in Chi-square between the model tested and the baseline model indicates that the two are noninvariant (i.e., significantly different).

<i>Model number</i>	<i>Model description</i>	$\chi^2$	<i>df</i>	$\Delta\chi^2$	$\Delta df$	<i>Statistical significance</i>
1	Combined baseline models, high versus low interdependence of job (Model 1)	2291.7	1234	—	—	—
2	Factor loadings, variables, regression paths and covariances constrained equal	2387.2	1278	95.5	44	p < .001
3	Only factor loadings constrained equal	2358.6	1263	66.9	29	p < .001
4	All factor loadings constrained equal other than item 4 (workplace friendship), item 8 (cohesion) and item 6 (OCQ) which were freely estimated.	2326.9	1260	35.2	26	ns
5	As 4 but with variables constrained equal also	2330.2	1263	38.5	29	ns
6	As 5 but with all regression paths and covariances constrained equal also	2355.4	1275	63.7	41	p < .05
7	As 5 but with only the path between friendship opportunities and friendship prevalence constrained equal also	2332.2	1264	40.5	30	ns
8	As 7 but with path between friendship opportunities and extrinsic satisfaction constrained equal also	2333.4	1265	41.7	31	ns
9	As 8 but with path between cohesion (social support) and extrinsic satisfaction constrained equal also	2333.7	1266	42	32	ns
10	As 9 but with path between cohesion (workload sharing) and extrinsic satisfaction constrained equal also	2336.1	1267	44.4	33	ns
11	As 10 but with covariance between friendship opportunities and cohesion (social support) constrained equal also	2344.4	1268	52.7	34	p < .05
12	As 10 but with covariance between cohesion (workload sharing) and cohesion (social support) constrained equal also	2339.3	1268	47.6	34	ns
13	As 12 but with covariance between friendship opportunities and cohesion (workload sharing) constrained equal also	2339.8	1269	48.7	35	ns
14	As 13 but with path between extrinsic satisfaction and intrinsic satisfaction constrained equal also	2340.2	1270	1270	36	ns
15	As 14 but with path between extrinsic satisfaction and organisational commitment constrained equal also	2344.5	1271	52.8	37	ns
16	As 15 but with path between intrinsic satisfaction and organisational commitment constrained equal also	2345.6	1272	53.9	38	ns
17	As 16 but with path between intrinsic satisfaction and intention to leave constrained equal also	2345.8	1273	54.1	39	ns
18	As 17 but with path between organisational commitment and intention to leave constrained equal also	2346.0	1274	54.3	40	ns

*Table 5: Goodness of Fit Statistics for Tests of Invariance Across Those in Relatively Less and More Interdependent Jobs*

Note.  $\Delta\chi^2$ , difference in  $\chi^2$  values;  $\Delta df$ , difference in degrees of freedom. All models are compared with Model 1.

As shown previously in Table 4, there was a significant difference between the baseline model and the fully constrained model for the high versus the low interdependence groups; this information is also displayed in the first two lines of Table 5. Once the noninvariance of a model has been established the next step is to test for the equivalence of the factor-loading pattern across the two groups. The third line in Table 5 shows the result of this test. The significantly different Chi-square indicates that not all factor loadings are invariant across groups. A noninvariant factor-loading pattern necessitates the use of partial measurement invariance in testing for the equality of regression paths and covariances (which are the parameters of interest in this case).

To ascertain which aspects of the factor-loading pattern vary across the two groups, each measurement model was tested for invariance<sup>iv</sup>. Table 6 shows the result of these analyses. The statistical significance of the change in Chi-square for the cohesion, friendship and organisational commitment measurement models indicates that those who report being in jobs which are relatively less or more independent, differ significantly in terms of the way these three measures fit.

Next, every factor within the cohesion, friendship and the organisational commitment measurement models was systematically tested for invariance in order to identify the noninvariant parameters. The results bearing on these series of analyses indicated that only one item from each scale was noninvariant. The noninvariant items were item 8 of the cohesion scale, item 4 of the workplace friendship scale and item 6 of the organisational commitment questionnaire. The complete series of tests is not displayed here but the relevant results are shown in Table 6. The significance of the change in Chi-square when all factor loadings are constrained equal, along with the non-significance of the change in chi-square when each of these three items was freely estimated, indicates that they were the sole source of invariance in each of the measurement models.

Model description	$\chi^2$	df	$\Delta\chi^2$	$\Delta df$	Statistical significance
<b>Cohesion Scale</b>					
Cohesion measurement model (unconstrained)	171.7	52			
Cohesion measurement model (fully constrained)	202.8	62	31.1	10	p < .001
All items except item 8 constrained equal (item 8 freely estimated)	184.7	61	13	9	ns
<b>Friendship Scale</b>					
Friendship measurement model (unconstrained)	65.4	26			
Friendship measurement model (fully constrained)	81.6	32	16.2	6	p < .05
All items except item 4 constrained equal (item 4 freely estimated)	76.1	31	10.7	5	ns
<b>Organisational Commitment Questionnaire</b>					
OCQ measurement model (unconstrained)	239.3	108			
OCQ measurement model (fully constrained)	263.6	119	24.3	11	p < .05
All items except item 6 constrained equal (item 6 freely estimated)	253.5	118	14.2	10	ns
<b>Job Satisfaction Scale</b>					
Satisfaction measurement model (unconstrained)	100.4	52			
Satisfaction measurement model (fully constrained)	113.6	60	13.2	8	ns

*Table 6: Goodness of fit statistics for tests of measurement model invariance across those in relatively less and more interdependent jobs*

Note.  $\Delta\chi^2$ , difference in  $\chi^2$  values;  $\Delta df$ , difference in degrees of freedom. Each constrained model is compared with the unconstrained model for the same measurement model.

When the full model is tested for invariance, allowing only the three scale items identified as being noninvariant to be freely estimated, there is no longer significant difference in the factor structure (as shown in line 4 of Table 5). The invariance of the regression paths and covariances (the parameters of interest) across high and low interdependence groups can now be tested.

The testing of invariance hypotheses involves increasingly restrictive models (Byrne, 2001). In Table 5, the model tested in line five is more restrictive than the one above it because, in addition to the partial equality constraint being imposed on the factor variances, equality constraints are also maintained for the variables (i.e., friendship opportunities, job satisfaction, etc.). The non-significant change in Chi-square indicates that the model remains invariant across the two groups (i.e., any difference that exists is not due to difference in the variables constrained as being equal). Model six (line six of Table 5) shows the change in Chi-square when, in



addition to the constraints described above (i.e., factor variances and variables), the regression paths and covariances are also constrained equal.

Because the difference in the Chi-square value between Model six and Model one is statistically significant ( $\Delta\chi^2_{(23)} = 40.0$ ), the hypothesis of invariance can now be rejected. The next step is to ascertain which regression paths or covariances are contributing towards this inequality. To do this, it is necessary to test for the invariance of each parameter individually, while continuing to hold constrained all parameters found to be cumulatively invariant across the two groups.

The change in Chi-square for model seven, which has only the path from friendship opportunities to friendship prevalence constrained equal is non-significant ( $\Delta\chi^2_{(12)} = 17.7$ ). This means this path is invariant across the two groups. Thus, the parameter from friendship opportunities to friendship prevalence is held invariant whilst the next path (from friendship opportunities to extrinsic satisfaction) is tested for invariance (model eight, Table 5); again the non-significant change in Chi-square indicates that this path is invariant across groups. Based on this general procedure of cumulatively maintaining equality constraints only for invariant elements, the next two parameters were tested and were also found to be invariant.

On testing for the invariance of the covariance between friendship opportunities and cohesion (social support), the change in chi-square ( $\Delta\chi^2_{(16)} = 28.8$ ) was significant (Model 11, Table 5). Thus, this parameter is noninvariant (different) across the two groups. The equality constraint for the covariance between friendship opportunities and cohesion (social support) was therefore released for all subsequent models, none of which resulted in a significant change in Chi-square (refer lines 12-18, Table 5).

To sum up, the testing of invariance hypotheses shown in Table 5 indicated that there was one main difference in the structural relations among the variables measured in the current study. Other than a single item in each of three measurement models (friendship, cohesion and organisational commitment), the factor-structure related to the measurement models is equivalent across the two

groups. There are, however, significant group differences with respect to the covariance between friendship opportunities and the social support aspect of cohesion.

Table 7 shows the correlation between the cohesion (social support) and friendship opportunity variables for high and low interdependence groups, along with the critical ratio values. Although both correlations are statistically significant, the analyses described above indicate that they are significantly different. It seems that the relationship between cohesion (social support) and friendship opportunities is significantly stronger for the Low Interdependence group. This implies that, for those in relatively less interdependent (more autonomous), jobs there is a stronger relationship between the social support aspect of cohesion and opportunities for friendship than there is for those in more interdependent jobs.

			C.R.	Estimate	S.E.	Correlation
<b>High Interdependence Group</b>						
Cohesion (social support)	↔	Friendship Opportunities	4.24	.13	.03	.37
<b>Low Interdependence Group</b>						
Cohesion (social support)	↔	Friendship Opportunities	6.22	.29	.05	.63

*Table 7: Correlation coefficients and critical ratio values (parameter estimate divided by standard error) of the correlation between the cohesion (social support) and friendship opportunity variables for high and low interdependence groups*

Note: C.R. values  $>\pm 1.96$  are statistically significant. Parameter estimates and standard errors are also shown, along with the correlation coefficient.

Finally the indices of fit were compared for the low and high interdependence groups. The non-equivalence of the causal structure suggests that the model may be better fitting for one group compared to another. Table 8 shows the goodness of fit indices when the model is tested separately for the high interdependence group compared to the low interdependence group. For the high interdependence group the CFI (.90) and the RMSEA (.058) both meet the criteria for a well fitting model, while for the low interdependence group the CFI (.85), does not meet the criteria for good fit (i.e.,  $>.9$ ), the RMSEA too, is higher than for the high interdependence group (RMSEA = .067), suggesting that the data fit the model less well. These results indicate that the causal model, showing the impact of workplace friends on

organisational outcomes, is better fitting for those in highly interdependent work roles.

<i>Scale</i>	$\chi^2$	<i>df</i>	<i>CFI</i>	<i>PCFI</i>	<i>RMSEA</i>
<i>High Interdependence</i>	1331.79	690	.90	.82	.058
<i>Low Interdependence</i>	1331.22	690	.85	.79	.067

*Table 8: Goodness of fit statistics for the high and low interdependence groups*

## DISCUSSION

There is support for hypotheses 1 and 2d; the structure was invariant across two groups of randomly assigned respondents, thereby cross-validating the model (hypothesis 1). In addition, the model was non-invariant across the two groups reporting having relatively less or more interdependent jobs (hypothesis 2d). Indices of fit indicated that data from respondents in relatively more interdependent jobs fit the causal model of friendships and organisational outcomes better than data collected from individuals in more autonomous jobs.

Hypotheses 2a, 2b and 2c were not supported however. Findings indicate *invariance* in the causal model when the samples compared were divided on the basis of needs for affiliation (hypothesis 2a) autonomy (hypothesis 2b) or achievement (hypothesis 2c). These are somewhat unexpected findings, given that it seems reasonable to expect that data gathered from individuals with high needs for affiliation and autonomy, particularly, would differentially fit a causal model of friendships compared to those reporting relatively lower needs. The non-invariance of the model when comparing individuals with relatively high or low needs for achievement is not as surprising, as the need for achievement is probably somewhat likely to be less directly linked to friendships at work.

A possible explanation for these unexpected findings may be that individuals expressing higher order needs are having them fulfilled outside the workplace. This relates to the concept of “compensation” from the work-family balance literature (Sumer and Knight, 2001, Lambert, 1990, Campbell-Clark, 2001). For example, if employees expressing high needs for affiliation have their needs met at home, they may be less likely seek to fulfil them at work; thus the absence of friends at work will

be unlikely to be any less or more salient for these individuals, than for colleagues who have low needs for affiliation.

The model was noninvariant (different) across the two groups reporting having relatively less or more interdependent jobs (hypothesis 2d). Specifically, one item in each of the measurement models for friendship opportunities, cohesion and organisational commitment differed, along with the correlation between friendship opportunities and the social support aspect of cohesion. The finding that the correlation between friendship opportunities and the social support aspect of cohesion is stronger for those who report being in relatively *less* interdependent jobs seems somewhat counterintuitive. A possible explanation is that those in very interdependent jobs will have opportunities for friendship, regardless of the perceived cohesion in their workplace (so a significant correlation will not be found) while those in very autonomous jobs will only experience increased opportunities for friendship if they also perceive themselves to be socially supported by their colleagues.

When the findings of group invariance between those with high and low needs are considered alongside the finding that the model was *noninvariant* when the sample was divided on the basis of the level of interdependence of individual's work roles an interesting pattern emerges. It seems that the degree of interdependence in an individual's job influences the relationships between the measured variables, while the subjective needs of employees for autonomy, affiliation and achievement will not. Findings that the model (featuring friendships as antecedent to organisational outcomes such as commitment and job satisfaction) is better fitting for those in interdependent jobs is consistent with the hypothesis that those in interdependent jobs will be more affected by friendship opportunities than those in autonomous jobs, and also with prior research by Winstead et al. (1995). Thus, it seems that the actual job someone does, and whether or not it is necessary to work with others in order to perform one's job, will affect the salience of informal interpersonal relationships at work.

### *Directions for Future Research: Negative relationships*

Friendships can degrade and turn sour. When this happens in a workplace the individuals concerned often have to continue to interact. Although no standard definition of such relationships yet exists, they can be characterised by conflict and disagreement, with communication ranging from "...passive to active dislike, animosity, disrespect, or destructive mutual interaction." (Dillard and Fritz, 1995: 12). Such relationships have been shown to affect both individuals (Rook, 1984) and organisations (Dillard and Fritz, 1995) adversely, causing stress and turnover. Although there is little research to date looking at the effects of negative relationships on productivity, it seems likely that they would interfere with co-operation and communication in work groups, and direct attention and energy away from the task at hand. The level of interdependence of employees' work roles is likely to impact on the salience of negative relationships, as it is likely that those in more autonomous work roles will be better able to "escape" from negative communication or situations at work. Future research examining the interdependence and / or autonomy of work roles might do well to focus on negative relationships, and how they impact on individuals' experience of work.

### CONCLUSION

This study cross-validated a model of friendships in the workplace and results suggest that the proposed model is robust, evidenced by the invariance of the model on four out of five tests for invariance. In addition, the findings demonstrate that there is a difference between those occupying relatively less or more interdependent jobs in terms of how the variables in the model relate to each other.

It was found that the correlation between social support and friendship opportunities is significantly stronger for those in less interdependent jobs. A likely explanation for this finding is that, for those who report being in highly interdependent work roles, friendship opportunities will exist regardless of the reported group cohesion. For those in very autonomous work roles, on the other hand, friendship

opportunities will probably be more dependent on the perceived social support in the work environment.

In addition, findings suggest that the relationship between opportunities for friendships in the workplace and job satisfaction, organisational commitment and intention to leave are not the same for all employees. While it makes logical sense that having more friends at work will make one's work day more pleasant, it seems that, in terms of organisational outcomes, friendships have less impact on those in relatively more autonomous jobs (evidenced by the relatively poor fit of the model for this group). This finding supports that of Fine (1986), who claims that those in occupations with relatively more autonomy will have less need for close friendships with their peers. Second, it seems that the reported *needs* of employees for affiliation, autonomy or achievement do not really affect the relationships between measured variables; regardless of respondents' reported needs, the impact of friends in the workplace remained considerable.

## ENDNOTES

<sup>1</sup> Modification indices are a measure of model misspecification, a large MI would argue for the presence of factor cross-loadings.

<sup>1</sup> Only the 'satisfaction with interpersonal interactions and the workplace' factor of the Job Satisfaction Scale is different. The model fitting procedure indicated a better fit to the data when the model was specified with one extra item from the scale.

<sup>1</sup> The two factors in the satisfaction scale were, (1) satisfaction with interpersonal interactions and workplace, and (2) satisfaction with aspects of actual job performed; variety/fulfilment. The two satisfaction factors relate closely to the 'extrinsic satisfaction' and 'intrinsic satisfaction' clusters of items, identified by Warr et al. (1979). The two cohesion factors were, (1) social support and cooperation and (2) workload sharing. The workload sharing factor is identical to that described by Campion et al (1993), while the remaining items loaded together as a single factor, combining Campion's 'social support' and 'communication/co-operation' factors.

<sup>1</sup> The measurement model for Intention to Leave was not tested here as it has only three items and therefore 0 df.

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